

PATENT SPECIFICATION

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in or relating to Radio Receivers

We, RACAL ENGINEERING LIMITED, a British Company of Western Road, Bracknell, Berkshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to radio receivers and more particularly is concerned with means for providing overload protection for the input circuit of radio receivers.

Particularly where a radio receiver is located close to a powerful transmitter, the resultant high signal input voltages may cause damage to the input circuit of the receiver.

One form of overload protection unit in accordance with the invention will now be described, by way of example only, in its application to a radio communications receiver, a circuit diagram of this unit accompanying this specification.

The receiver for which this particular device has been designed has in its input an antenna low-pass filter followed by a step-attenuator which proceeds the input tuned circuits of the radio frequency amplifier. It is possible for high signal voltages to cause damage to elements in all of these circuits which precede the radio frequency amplifier.

The overload protection unit shown in the accompanying circuit diagram simulates a single section of a conventional Pi-filter network and consists of two series-parallel inductors L1, L2 with a shunt input capacitor C1 and two silicon diodes D1, D2 connected back-to-back in parallel across the output of the filter. The capacitance of the capacitor C1 is chosen to correspond to the output capacitance constituted by the approximate zero bias capacitance of the two diodes D1, D2. The aerial 10 is connected to a coaxial input socket 11 and the coaxial out-

put plug 12 of the unit is connected to the normal aerial input terminal (not shown) of the receiver.

In operation, when the radio frequency potential developed across the parallel diodes D1, D2 exceeds a predetermined value, the diodes conduct heavily and effectively short-circuit the input of the receiver. At other times the insertion loss of the unit is low.

By winding the inductors L1, L2 of resistance wire indicated diagrammatically by resistors R1, R2, the current through the diodes D1, D2 can be limited to a safe value at the lower end of the frequency range; at higher frequencies the inductive impedance itself of inductors L1, L2 is sufficient to limit the current through the diodes.

By way of example only, it may be stated that such an overload protection device has been constructed which is continuously rated at a maximum radio frequency input of 14.5 volts r.m.s. with a continuous current input of 2.5 amps r.m.s. at frequencies within the range 500 Kc/s to 4 Mc/s.

In order to protect the capacitor C1 and diodes D1, D2 from the heat dissipated by the two inductors L1, L2, the components may be mounted in a metal box (not shown) with a dividing wall separating the inductors L1, L2 from the other components, ventilating holes being provided in that part of the walls of the box which form the compartment for the inductors. The diodes may have their terminal studs in heat-conducting contact with a wall of the box remote from the inductors, this part of the wall acting as a heat sink.

WHAT WE CLAIM IS:—

1. Apparatus for providing overload protection for the input circuit of radio receivers comprising an inductor, a capacitor and two unidirectionally conductive devices connect-

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ed back to back in parallel with said inductor connected in series between said input circuit and the signal input and said capacitor and said unidirectionally conductive devices connected in shunt therebetween, whereby the components simulate a Pi-filter network, a predetermined radio-frequency potential across said unidirectionally conductive devices rendering them alternatively conductive and thereby by-passing signal from said input circuit.

2. Apparatus according to claim 1, wherein said unidirectionally conductive devices are semi-conductor diodes.

15 3. Apparatus according to either one of the preceding claims, wherein the total shunt

capacitance of said unidirectionally conductive devices at zero bias is approximately equal to that of said capacitor.

4. Apparatus according to any one of the preceding claims, wherein said inductor is wound of resistance wire to limit the current therethrough at low radio frequencies.

5. Apparatus for providing overload protection for the input circuit of radio receivers substantially as described herein.

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PROVISIONAL SPECIFICATION

Improvements in or relating to Radio Receivers

We, RACAL ENGINEERING LIMITED, a British Company of Western Road, Bracknell, Berkshire, do hereby declare this invention to be described in the following statement:—

This invention relates to radio receivers and more particularly is concerned with means for providing overload protection for the input circuit of radio receivers.

Particularly where a radio receiver is located close to a powerful transmitter, the resultant high signal input voltages may cause damage to the input circuit of the receiver.

The novel features of the invention will be readily apparent from the following description of one form of overload protection unit in accordance with the invention, which will be described by way of example only in application to a radio communications receiver.

The receiver for which this particular device has been designed has in its input an antenna low-pass filter followed by a step-attenuator which proceeds the input tuned circuits of the radio frequency amplifier. It is possible for high signal voltages to cause damage to elements in all of these circuits which precede the radio frequency amplifier.

The overload protection unit simulates a single section of a conventional Pi-filter network and consists of two series-parallel inductors with a shunt input capacitor and two silicone diodes connected back-to-back in parallel across the output of the filter. The capacitance of the capacitor is chosen to correspond to the output capacitance constituted by the approximate zero bias capacitance of the two diodes. The aerial is connected to the input of the unit and the output of

the unit is connected to the normal aerial input terminal of the receiver.

In operation, when the radio frequency potential developed across the parallel diodes exceeds a predetermined value, the diodes conduct heavily and effectively short-circuit the input of the receiver. At other times the insertion loss of the unit is low.

By winding the inductors of resistance wire the current through the diodes can be limited to a safe value at the lower end of the frequency range; at higher frequencies the inductive impedance itself is sufficient to limit the current through the diodes.

By way of example only, it may be stated that such an overload protection device has been constructed which is continuously rated at a maximum radio frequency input of 14.5 volts r.m.s. with a continuous current input of 2.5 amps r.m.s. at frequencies within the range of 500 Kc/s to 4 Mc/s and with radio frequency input voltages exceeding 14.5 volts at operating frequencies between 4 Mc/s and 194 Mc/s.

In order to protect the capacitor and diodes from the heat dissipated by the two inductors, the components may be mounted in a metal box with a dividing wall separating the inductors from the other components, ventilating holes being provided in that part of the walls of the box which form the compartment for the inductors. The diodes may have their terminal studs in heat-conducting contact with a wall of the box remote from the inductors, this part of the wall acting as a heat sink.

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